Biodiesel in the Monadnock Region:
Recent Keene State research and the Monadnock Biodiesel Collaborative

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City of Keene and KSC

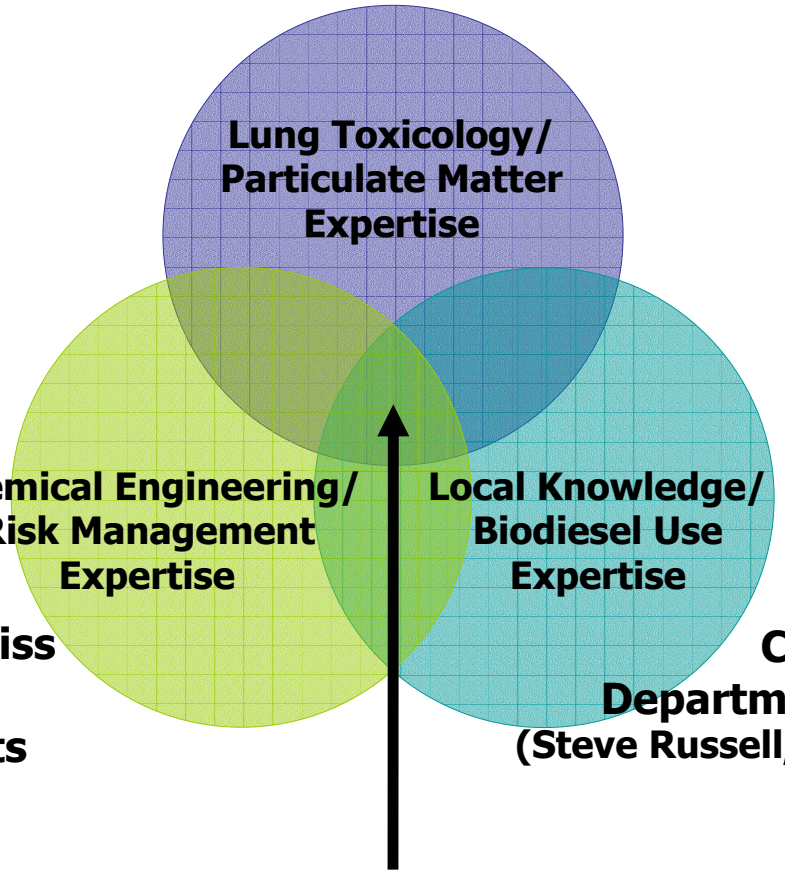
Both have been using B20 since 2002!

- The city has used over 200,000 gallons of B20 in the city fleet, fire engines and dump trucks.

- The college uses B100 in everything with a diesel engine!

Even lawnmowers!

Dr. Melinda Treadwell
&
KSC Students



Dr. Nora Traviss
&
KSC Students

City of Keene
Department of Public Works
(Steve Russell, Duncan Watson & others)

Collaborative Exposure Assessment

To answer community question: "Is Biodiesel healthier?"

By HYPOTHESIS: "Does B20 use reduce PM 2.5, EC/OC and NO2?"

Diesel Engines and Air Quality

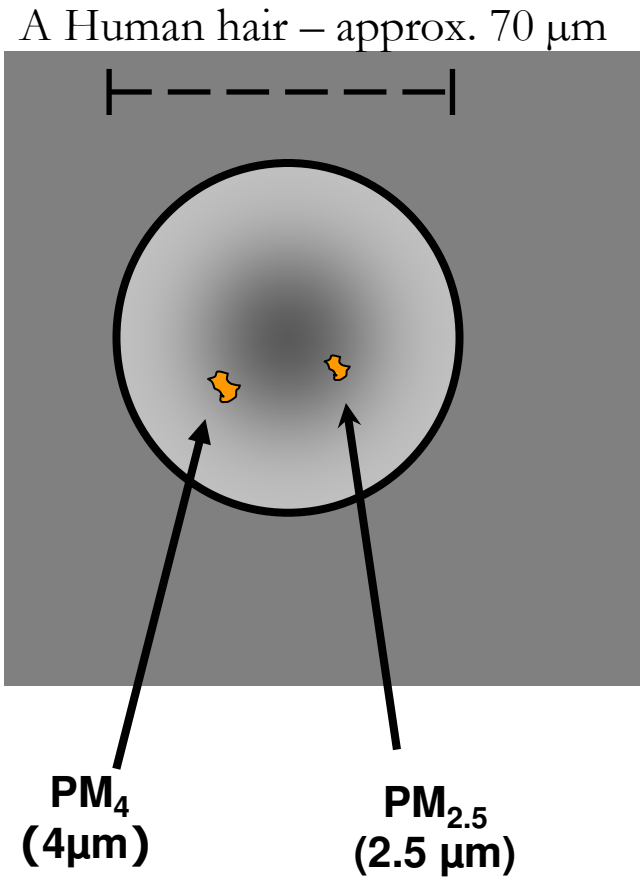
Diesel engines - MAJOR environmental and public health concern

- Oxides of Nitrogen or NOx;
- Fine particulate matter
- A complex mixture of volatile chemicals (carcinogens or respiratory damaging agents)

Downtown LA, 4/29/2004

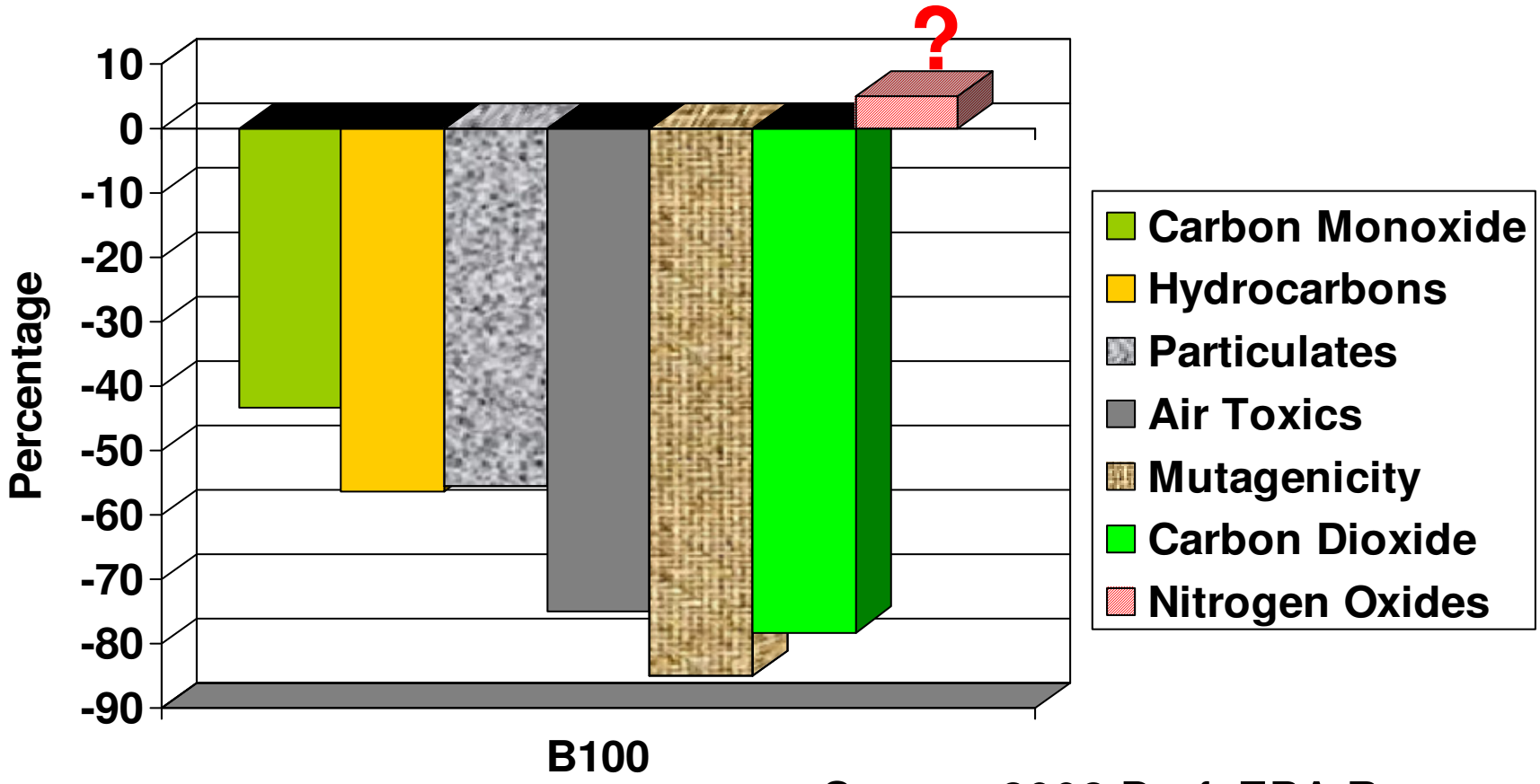
Source: MSNBCmedia.msn.com

What is $PM_{2.5}$?



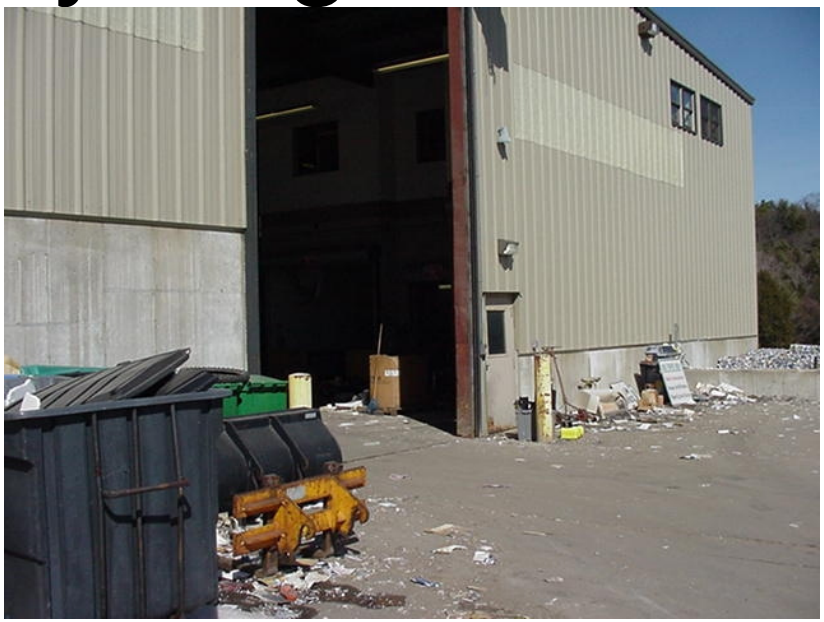
- All solid and liquid particles 2.5 microns in aerodynamic diameter or below
- 'Fine' particles
- 1/28 the diameter of a human hair at the largest
- Associated with asthma, chronic bronchitis, congestive heart failure, irregular heartbeat and other illnesses

Emission Change between Biodiesel and Petrodiesel

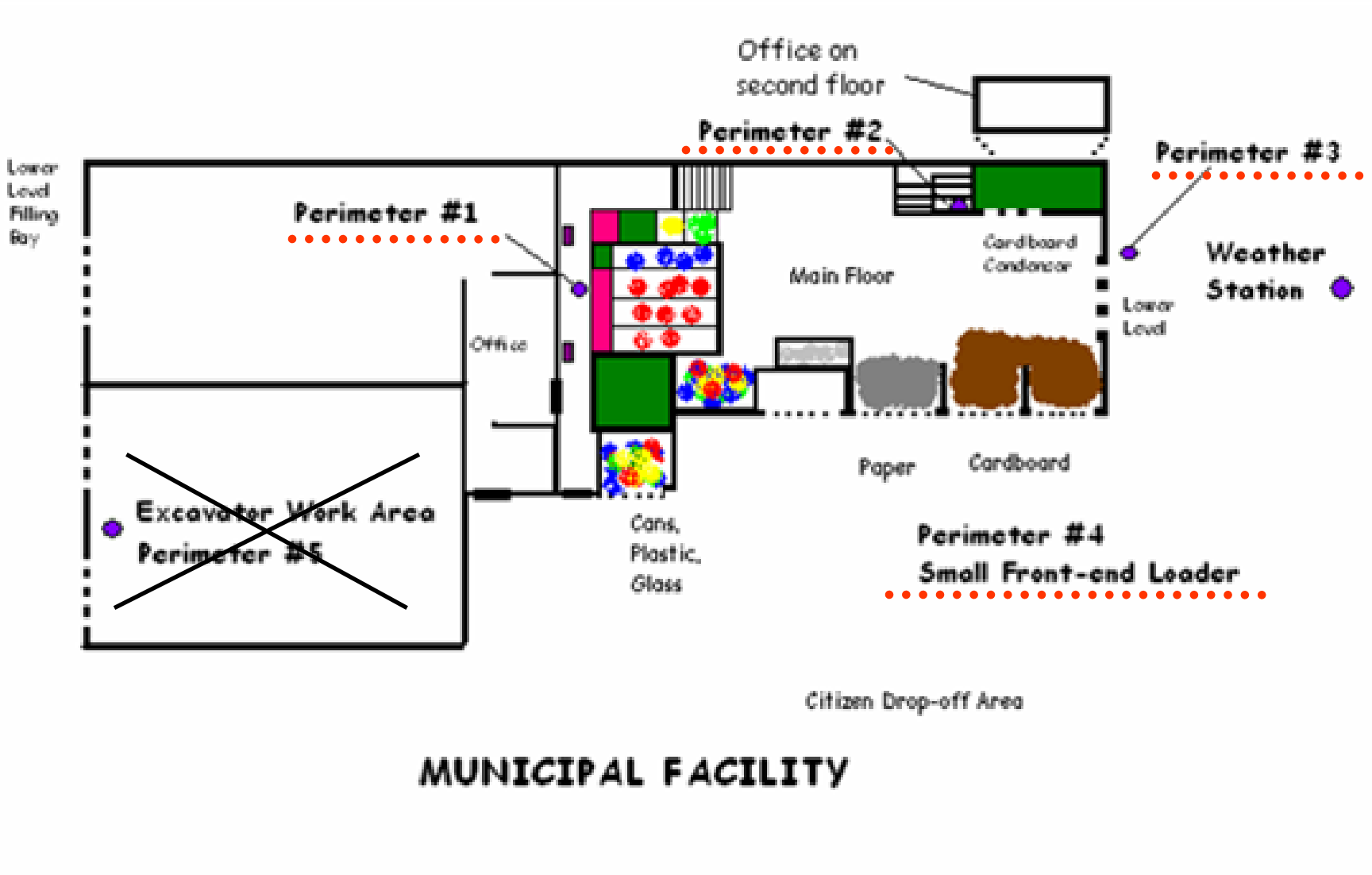


Source: 2002 Draft EPA Report

City of Keene Recycling Center



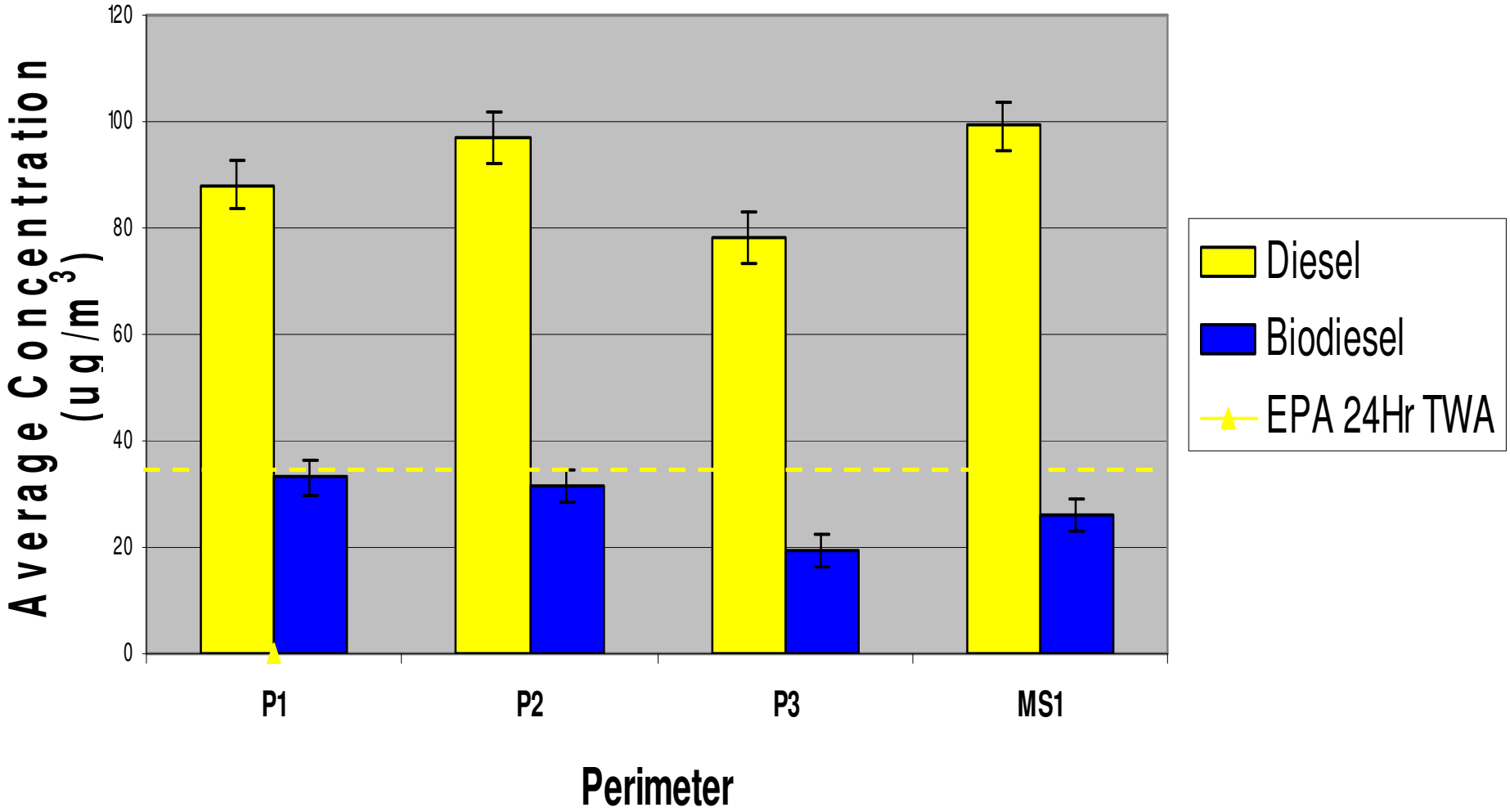
Keene Recycling Center



Environmental Air Monitoring Equipment

$PM_{2.5}$ - 24 HR Time Weighted Average Using Ambient Air Data

Diesel vs. Biodiesel



Research Results

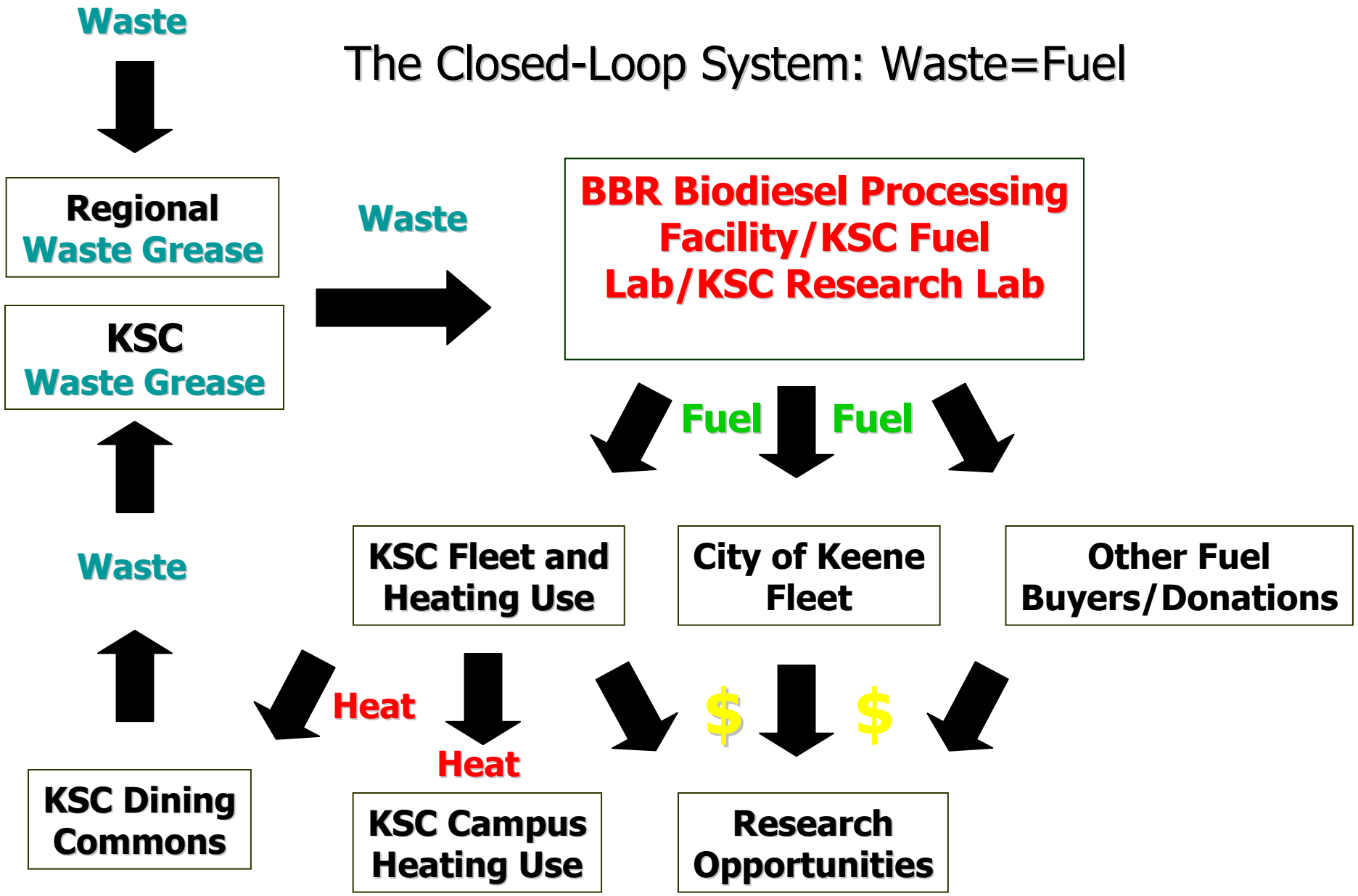
– Total site Average **decrease:** (**PM2.5**) **60.4%**

– Total site Average **decrease:** (**Elemental Carbon**): **22.3%**

– Total site Average **increase:** (**Organic Carbon**) **+370.4%**

– Total Nitrogen Dioxide **increase:** + **18.5%**

The Closed-Loop System: Waste=Fuel



Cost savings

Revenue generating

Can Biodiesel Solve Waste and Water Pollution Problems?

(Source: Olof Hansen, EPA Region 9, Waste Division)

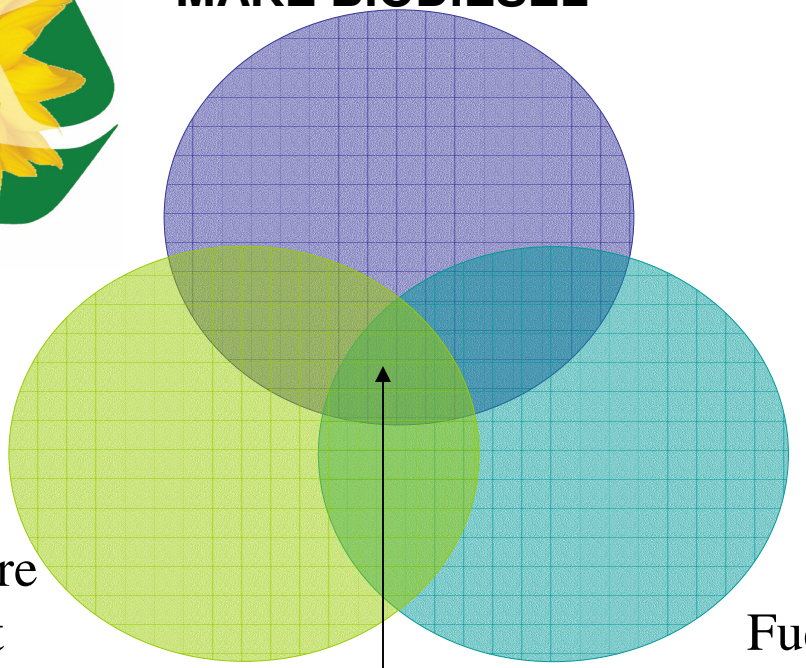
Yes…by converting waste grease to a higher value commodity.

- Diverts large waste stream from:
  - Landfills or illegal dumping
  - Publicly-owned treatment works (POTWs)

- Prevents spills and sewer blockages:
  - 80% of sewer spills in the USA are caused by FOG (Fat – Oil - Grease)
  - **In 2001, EPA sued Los Angeles for 800 sewer spills, due to pipes clogged by FOG**
- **A problem in Keene, NH**

Monadnock Biodiesel Collaborative

BBR Refinery
MAKE BIODIESEL



RESEARCH BIODIESEL

KSC Exposure Assessment Research

TEST BIODIESEL

KSC ASTM Fuel Quality Testing Lab

New Facility

Keene State College/
Batchelder Biodiesel Refiners
Recycling Waste Grease/
Make Biodiesel

KSC/City of Keene
Use Biodiesel Fuel

mbc
Monadnock Biodiesel Collaborative

KSC/BBR
Adapt/Improve
Process

KSC/City of Keene
Research New
Exposures

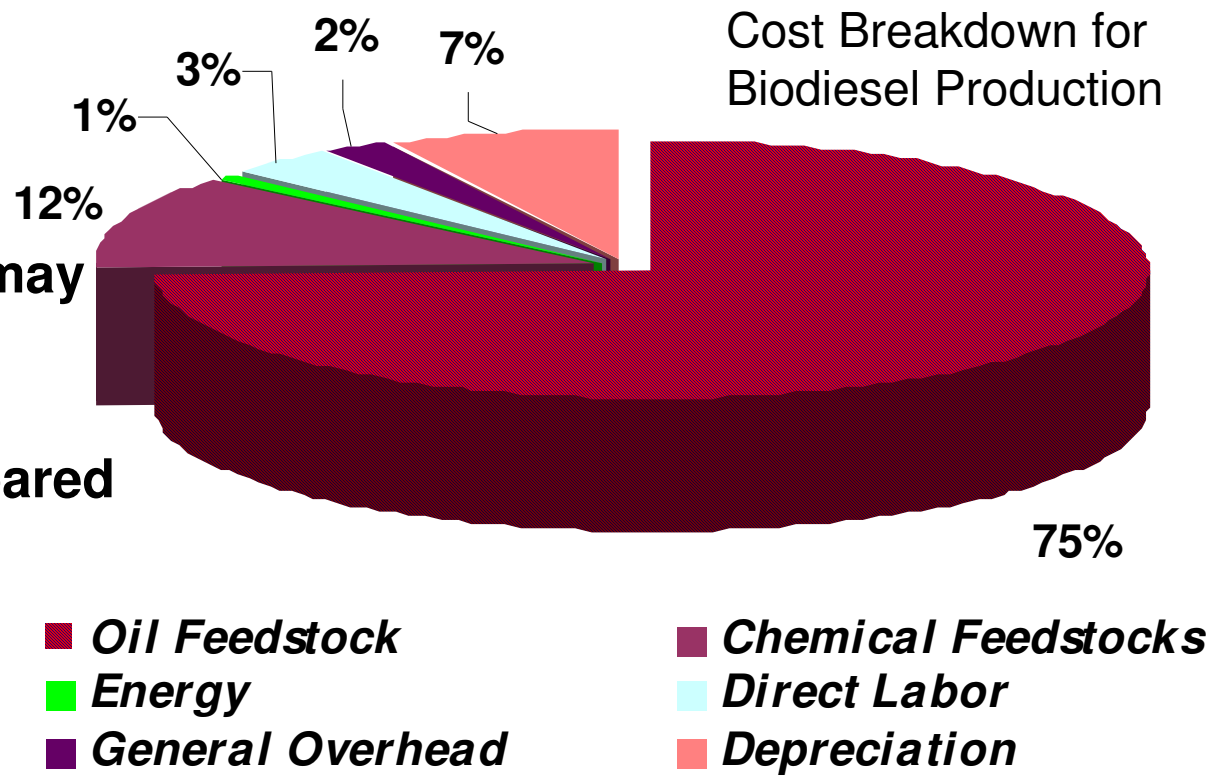
Keene State Safety and Architecture students win Honorable Mention at EPA P3 Sustainable Design Competition, April 2008

National, regional and local policy issues

What are the Economic Challenges?

Source: O. Hansen, EPA

Waste cooking oil may reduce biodiesel production costs by 75% when compared to virgin oil



National challenges

- Quality – ASTM D6751 standard
  - Improving but gaps remain
- Warranties
  - ditto
- Food vs. fuel controversies, confusion with ethanol
- Feedstock issues
- Transportation to market
- Environmental issues: increased NOx, impacts on health??

Regional challenges

- A NH Biodiesel Commission released a study in 2008
  - http://www.granitestatecleancities.org/biodiesel/HB689_biodiesel_report.pdf
  - Multiple recommendations: 5% bio in all state operated vehicles and heating systems, support tax incentives, support local farm/production systems, etc.
  - A number of legislative initiatives should emerge from this report

Local needs

- Community support for local production
- Local production will increase local jobs, reduce cost barriers
- Local distribution capacity expanded…
- But local quality must be assured
- Increase local demand
  - More demand = more supply = lower cost!

The future…

- The Monadnock Biodiesel Collaborative website is live!
  - http://www.monadnockbiodiesel.com/index.htm

BBR will hosted an open house at its facility in Nashua, NH on December 17, 2008.

This facility and the Keene facility (scheduled for April 2009) are each expected to produce between 250 and 500 K a year of ASTM quality B100.

The future…

- Fund raising for the Keene State ASTM Fuel Quality Laboratory & Emissions Research continues
- Site development/BBR startup in Keene, NH
- Work with colleagues at NHDES and local municipalities
- Feedstock and distribution agreements

The future…

Keene State College received a National Institute of Health/Center of Biological Research Excellence (COBRE) $750K research grant to continue its biodiesel exposure work, in collaboration with Dartmouth College, the University of Vermont and the DOE's National Renewable Energy Lab.

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THANK YOU!

Questions? Comments?